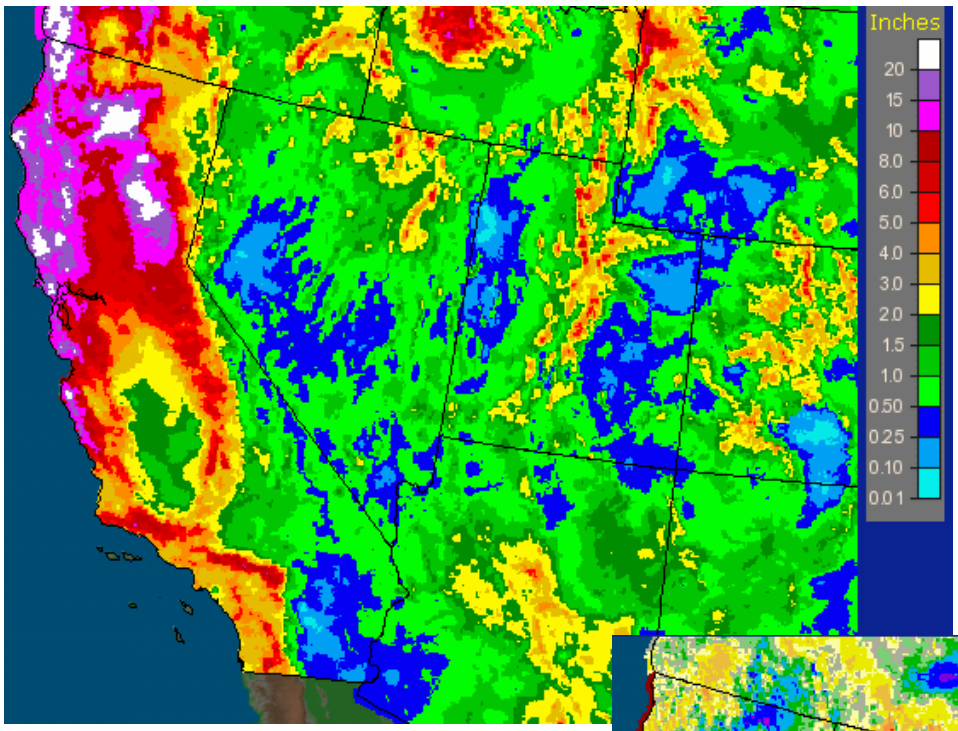
WINTER 2014-2015

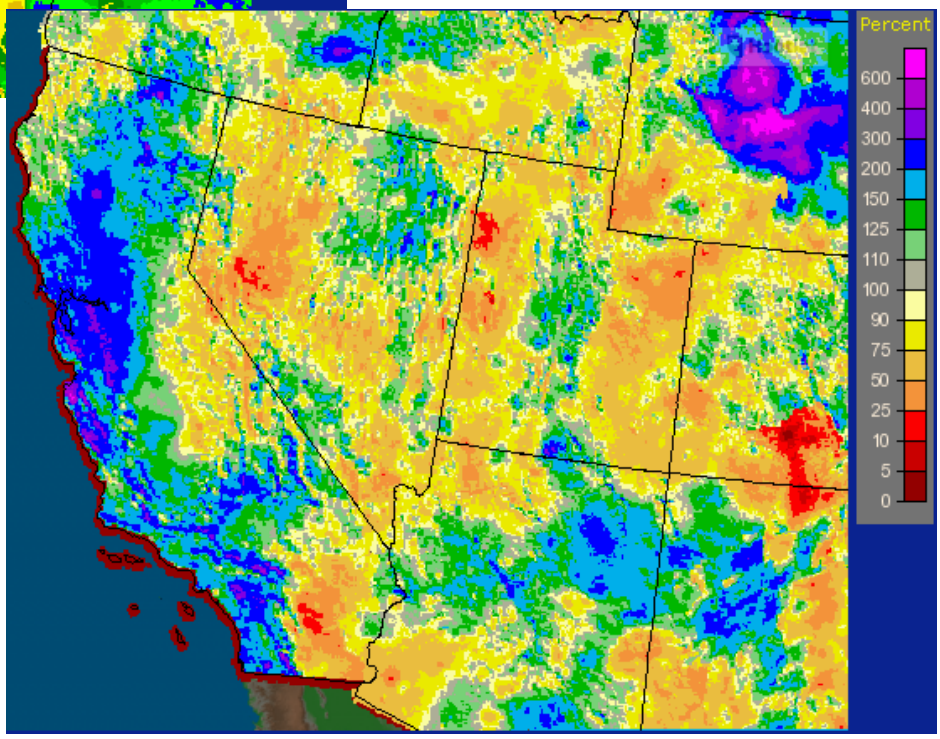
THE GOLD AND SILVER SPOTTER

NATIONAL WEATHER SERVICE - RENO,NV

Significant California Rain in December



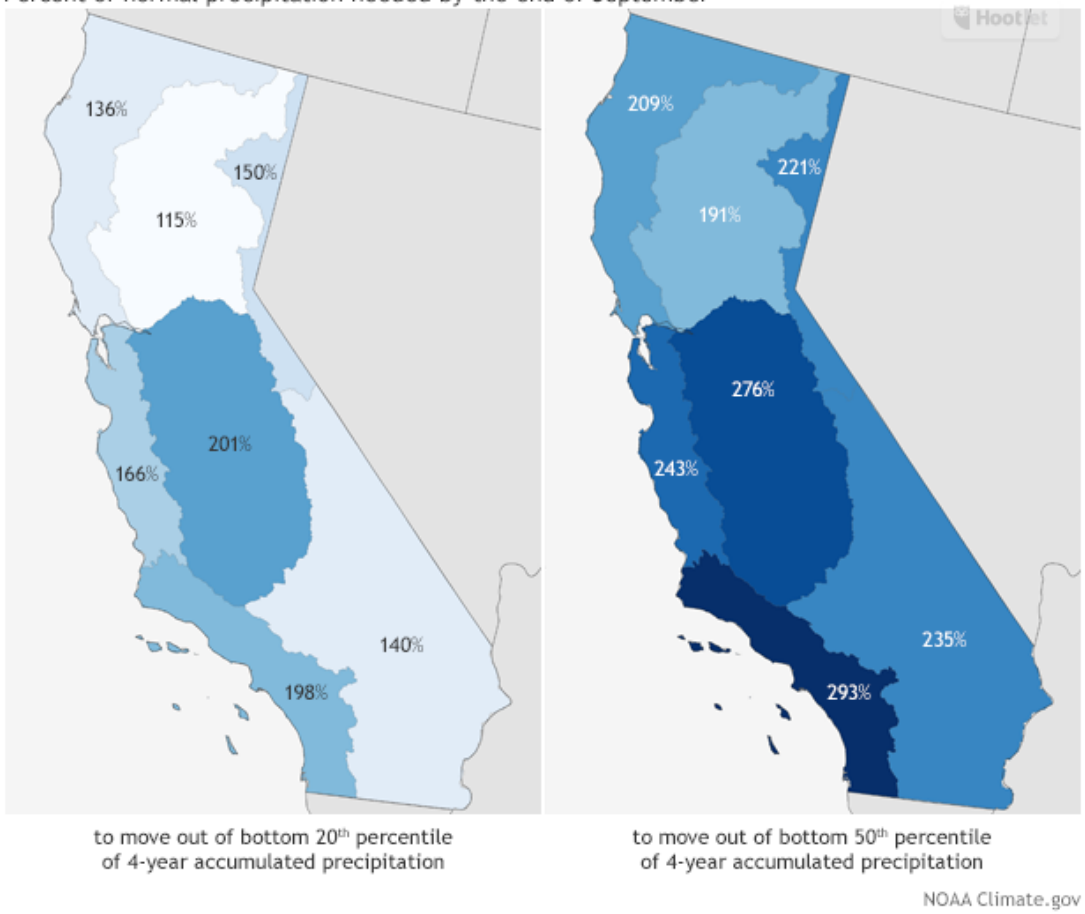
An atmospheric river event in mid-December along with several other weak systems brought significant rain to much of California, but it didn't translate to much east of the Sierra crest, nor did it amount to a large snow pack due to the higher snow levels. The graphic to the left shows the interpolated total precipitation for the month of December, with the bottom graphic illustrating the percentage of normal this translated to for the month. It becomes clear that much of California, outside of the southern Sierra and interior deserts had well above normal amounts of precipitation for the month, while much of western Nevada remained below normal for the month. We have received many questions asking if this ended the drought, and in a word, No. Want to find out more...turn to page two of the newsletter.



Inside this issue:

If We Got a Lot of Rain…Why isn't the Drought Over?

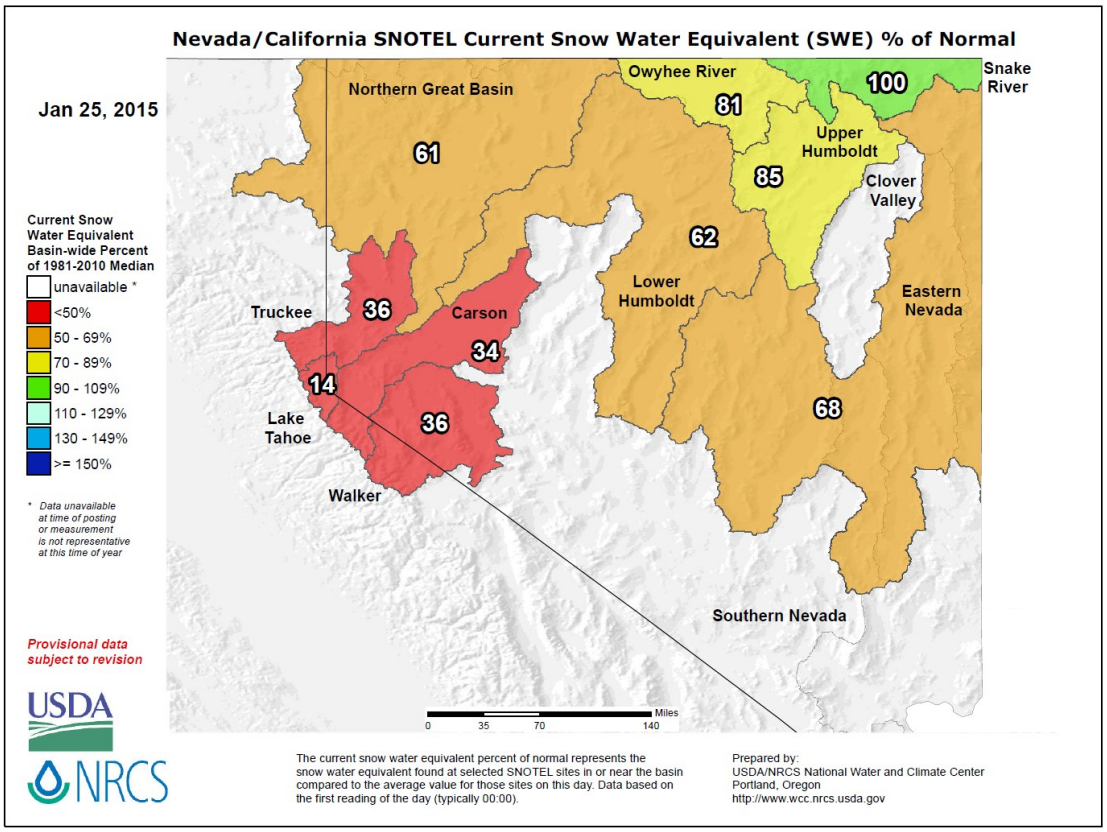
Monthly precipitation totals across northern California in December were generally in the 16-20 inch range, which most definitely boosted reservoir levels. Even so, most of these reservoirs remain 15-30 percent below normal for this time of the year. The lack of water during the past three years has lead to precipitation deficits between 30-50 inches in the Sierra and with deficits like these it is going to take more than a couple of big storms to dig ourselves out of the drought. How much more…well a lot if you look solely at precipitation amounts. We'll take a look at two thresholds: the 20th percentile, which is one of the indicators the drought monitor uses , and the 50th percentile, which would be in the middle of the historical precipitation pack. Looking back to 1928, California precipitation totals are so far below-average that the totals by September (the end of the water year) would need to match or even blow away some existing records to climb up to the 50th percentile. Even exceeding the 20th percentile would require more than 100% of normal precipitation in all the state's climate divisions. This percentile analysis is a simplistic view on the drought situation and a lot more factors into what can deepen or improve a drought. This includes when precipitation forms, how long it falls, how intense it was and whether it rains or snows.



*Percent of normal precipitation required from mid-December through the end of the water year in September in order to reduce rainfall deficits. (**left**) All climate divisions would need more than 100 percent of normal precipitation just to emerge from the lowest 20% of values (20th percentile) for all four-year periods in the historical record. (**right**) To be restored to the middle of the historical pack (50th percentile), several would need to exceed all-time precipitation records by many inches. Maps by NOAA Climate.gov, based on analysis of Climate Division data by Rich Tinker, NOAA Climate Prediction Center.*

Many locations in California and western Nevada depend heavily on the Sierra snowpack for the water supply in the dry spring and summer months. Unfortunately, snowpack remains well below normal for this time of the year in much of the Sierra. See the graphic on the next page for just how far below normal.

This article was adapted with information from Climate.gov. For the original article please see: http://goo.gl/FKtcAU.



The sad state of affairs so far this winter showing how far below we are in snow water equivalent in many areas. We can only hope for a good February/March!

Precipitation Records Around the World—Hard to Believe!

We may have not seen much precipitation lately, but at least we get more than they average in Quillagua, Antofagasta Region, Chile with only 2 mm (0.0079 inch) or less per year! However, if you want some rain and snow envy, check out these incredible records!

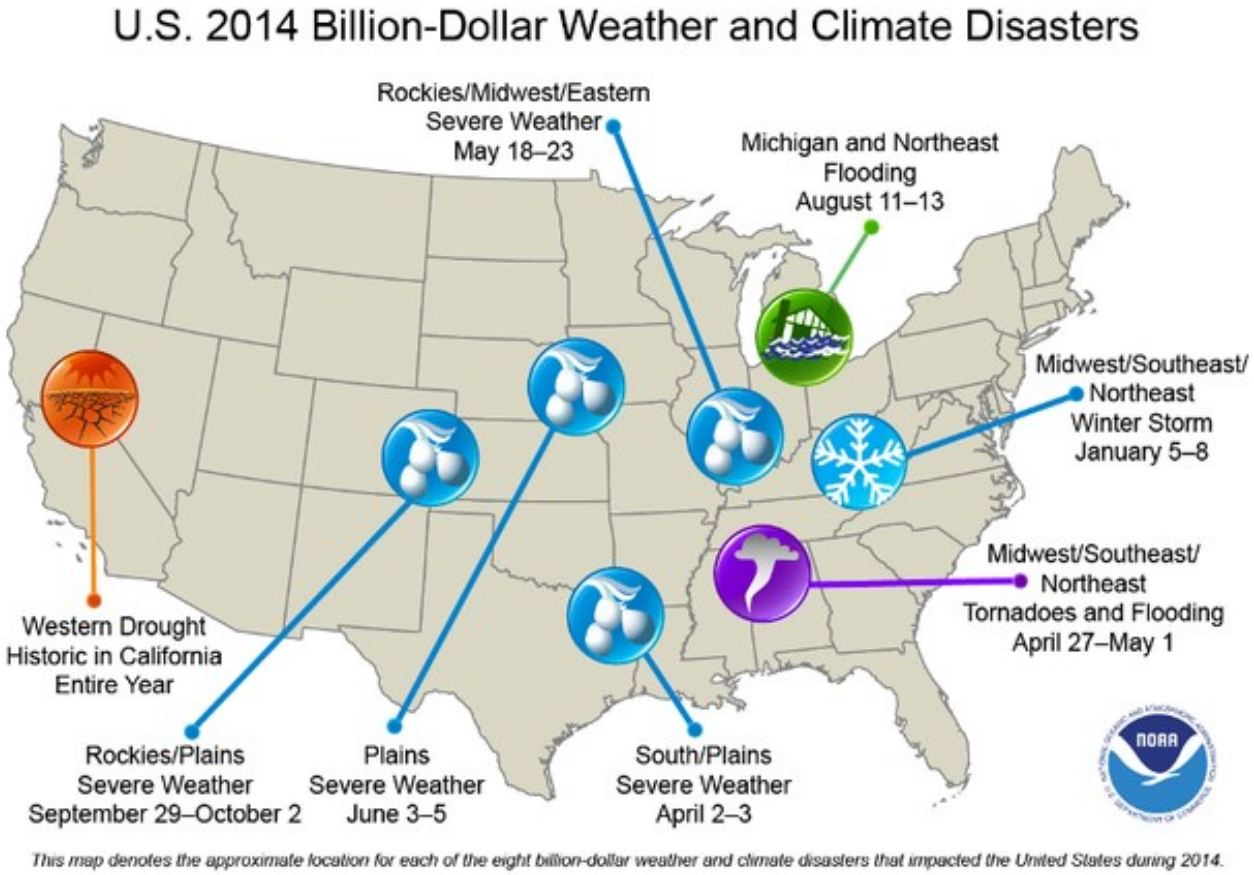
Most Rain:

- **One Minute: 1.5” - Barot, Guadeloupe, November 26, 1970**
- **One Hour: 12” in 42 minutes – Holt, Missouri, June 22, 1947**
- **12 Hours: 45” - Foc-Foc, Réunion, January 8, 1966 (Tropical Cyclone Denise)**
- **24 Hours: 71.9” - Foc-Foc, Réunion, January 8-9, 1966 (Tropical Cyclone Denise)**
- **48 Hours: 98.1” - Cherrapunji, Meghalaya, India June 15-16, 1995**
- **72 Hours: 154.7” - Commerson, Réunion, February 24-26, 2007**
- **96 Hours: 191.7” - Commerson, Réunion, February 24-27, 2007**
- **One Year: 1,042” - Cherrapunji, Meghalaya, India, 1860-61**

Most Snow:

- **One Year Period: 102 feet—Mt Rainier, Washington, February 19, 1971-February 18, 1972**
- **One Season (July 1—June 30): 95 feet—Mount Baker, Washington, 1998-1999**
- **One Calendar month: 390”- Tamarack, CA , January 1911**

The Western Drought is Part of the 2014 Billion-Dollar Weather and Climate Disasters…



This map denotes the approximate location for each of the eight billion-dollar weather and climate disasters that impacted the United States during 2014.

What is the Status of El Niño?

During December 2014, the positive sea surface temperature (SST) anomalies *decreased* across the central and east-central equatorial Pacific, which is not a favorable El Niño sign. Positive SST anomalies continue, but are only indicative of a weak El Niño and the associated atmospheric circulations that usually develop with an El Niño have not fully formed. The forecast continues to show a 50-60% chance of weak El Niño conditions during the next 2 months, with ENSO-neutral developing by early spring. For a full discussion from the Climate Prediction Center (CPC) visit: http://goo.gl/Xx3Fx. Please keep in mind that El Niño has little baring on our winter weather. For a review, check out the summer/fall 2014 newsletter.

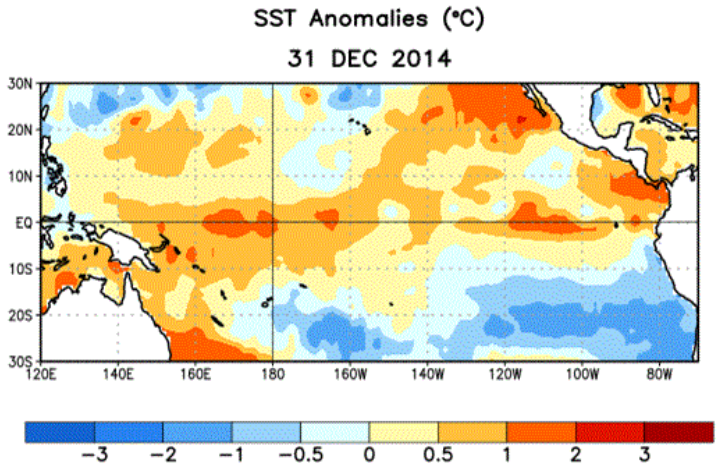
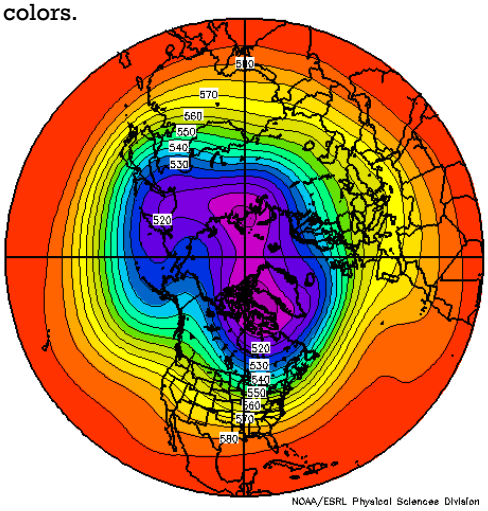


Figure 1. Average sea surface temperature (SST) anomalies (°C) for the week centered on 31 December 2014. Anomalies are computed with respect to the 1981-2010 base period weekly means.

What Goes Up Must Come Down

Below: A reanalysis composite 500 mb heights (common pressure for ridge/trough analysis) over the past 90 days showing the ridge over the west in the warmer colors and trough over the east in the cooler colors.



The west has been unusually warm and dry, but our neighbors in the northeast can't say the same. They have been unusually cold and wet with several places setting record cold in the past year. Why is one part of the country warm and the other so cold? Simply put, what goes up must come down. A series of waves (ridges and troughs) circle the globe with the jet stream, which drives weather systems, following the ridges and troughs. Keep in mind that a ridge corresponds to warm and dry weather while a trough corresponds cold and wet weather. At times, blocking situations can occur when the flow becomes too amplified, as we have seen recently. This is why the west continues to be warm and dry and the east is cold and wet. Now what is causing this larger scale phenomenon to occur for two winters now? This is the million dollar question and to be honest, we just don't know. There are still many unknowns in atmospheric/oceanic circulations and as the science continues to grow, hopefully we will find out an answer eventually!

How Do the Past 5 Winters Compare to this

While we have been below normal in precipitation these past few years, we did have a couple well above normal years in 2009-10 and 2010-11. See the chart below to see how select cities stack up in seasonal snowfall totals. Note: these locations were chosen due to having snowfall records, but some do not have a long enough period of record (30 years) to have a seasonal climatology, which is why an * is present. These stations have 20-25 years of data.

Annual Snow Totals (inches)	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014	2014-Jan 2015	Seasonal Averages
Reno 4410 feet	34.8	34.0	8.2	9.4	6.2	2.2	21.8
Carson City 4761 feet	32.0	40.7	9.0	16.1	18.2	3.1	10.3
Bridgeport 6470 feet	67.5	64.8	10.5	39.7	33.8	0.6	24.4
Lee Vining 6797 feet	99.4	139.5	33.8	39.3	47.1	5.3	68.7*
Portola 4850 feet	116.3	170.5	69.5	70.5	14.0	4.0	42.9
Dagget Pass 7334 feet	100.0	197.2	84.5	106.0	114.0	24.7	71.4*
Tahoe City 6230 feet	221.0	268.5	106.5	112.0	59.5	9.0	184.9
Mammoth Lakes 7804 feet	239.1	372.2	111.5	117.8	56.4	13.3	188.07*

Working Together To Save Lives

New Email!! Please email Rev.Spotters@noaa.gov if you need to contact us. This will go to several of us at the office so that we can better respond to your inquires.

Follow us on

Lenticular Clouds—How Do They Form?

For those of us living in the lee of the Sierra, we get to experience something frequently that most would consider a special treat—lenticular clouds. We are in the perfect location with predominately westerly winds and a large north-south oriented mountain range. When moist and stable air flows over the Sierra crest, a series of large-scale standing waves may form on the downwind side. Think of it similar to waves moving across the ocean where one point is the crest of the wave and the other the trough or crash of the wave. If the temperature at the crest of the wave drops to the dew point, moisture may condense to form lenticular clouds. As the air propagates toward the east, drying takes places as the air moves into the trough of the wave. If conditions are right, long strings of lenticulars can form near the crest of each successful wave. You will sometimes see these clouds stacked up vertically which can occur if the right conditions exist for wave cloud formation at several altitudes. See graphic below for more details.